Capturing Adult American Bitterns

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Abstract.—Capture techniques were developed to study the American Bittern (*Botaurus lentiginosus*). Mirror traps, mist nets, landing nets, night capture, funnel traps and net gun techniques were evaluated. Mirror traps and mist nets were used with a tape recording of the pumping call of the male bittern. Mist nets were also used to capture females at nest sites. Long-handled fish landing nets were used to capture molting birds and females on nests. Funnel traps were set at feeding sites. Mirror traps had a 50% success rate and were the most efficient means of capturing males. Mist nets were versatile with success rates of 40% on males and 50% on females. Landing net success was 76% on males and 70% on females but restricted to specific situations. Night capture was successful 33% of the time and only on molting birds. Net guns had limited success (6%) due to lack of skill and difficult to get close to birds. Funnel traps were not fully tested. *Received 1 February 2002, accepted 15 June 2002.*

Key words.—American Bittern, *Botaurus lentiginosus*, funnel trap, mirror trap, mist net, net gun, night capture, trapping.

Waterbirds 25(4): 505-508, 2002

A study to examine the life history of the American Bittern (*Botaurus lentiginosus*) was initiated at Agassiz National Wildlife Refuge in northwestern Minnesota in 1994. We wanted to capture American Bitterns for radio-marking to study home range, habitat use, and breeding ground fidelity. American Bitterns at Agassiz National Wildlife Refuge utilize grasslands, shallow marsh and deep marsh habitats (Brininger 1996; Azure 1998). This paper describes the use of mirror traps, mist nets, landing nets, night capture, funnel traps and net gun techniques developed to meet the field situations encountered and evaluates capture success from 1994 through 1998.

METHODS

Mirror Trap

Mirror traps have been used to capture drumming Ruffed Grouse (*Bonasa umbellus*) because male grouse return repeatedly to the same spot and traps could be placed where the bird would be oriented to see its reflection (Tanner and Bowers 1948; Gullion 1965). Mirror traps have also been used on waterfowl known for aggressive behavior during the breeding season (Savard 1985). Recordings of the territorial vocalization of male American Bitterns were used to bring adult male bitterns to the traps and trails were used to orient them with the mirror. Mirror traps were constructed of 5 cm × 10 cm mesh welded wire, 91 cm long, 40 cm wide by 61 cm high (Fig. 1). A single sliding door, measuring 25 cm × 40 cm, was released by a stiff 9-gauge wire connected to a treadle 35 cm inside the trap. A mirror, 30 cm × 40 cm, was fastened to the opposite end of the trap.

Mirror traps were deployed between dawn, and two to three hours after sunrise by approaching a vocalizing male bittern to within 100 m in a shallow marsh setting. Traps were set in water depths from zero to 15 cm. In the first year, most traps were placed individually, but afterwards they were set in pairs. When set in pairs, traps were back to back in either existing trails or short trails made by stepping down vegetation for 3 m in length and 40 cm wide. When set individually, the back of the trap was placed against a clump of vegetation to discourage an approach from the rear. Vegetation was draped against the trap sides to prevent males from approaching from the side. A battery operated cassette tape player was strapped to the top of the trap and played an endless loop cassette on which was recorded a sequence of a male bittern vocalizing four times. The sequence was repeated at one-minute intervals at the maximum volume that did not distort the sound. Traps were left unattended for up to four hours. Flagging tied to the

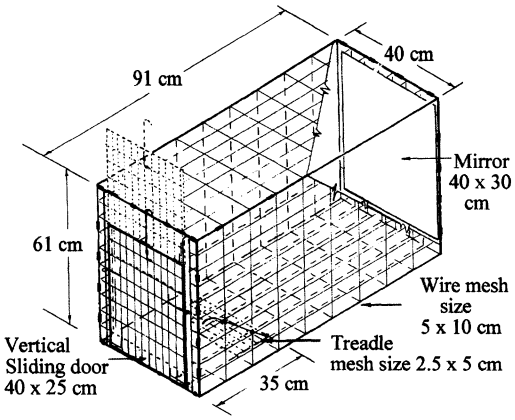

Figure 1. Mirror trap used to capture adult male American Bittern. A recording of a male bittern vocalizing on a continuous loop cassette was played in a cassette tape player placed on top of the trap to attract male bittern to the set. A trail in front of the door was used to orient the male bittern with the mirror. Drawing by Ell-Kay Foss, Wildlife Technician, Red Lake Wildlife Management Area, Minnesota Department of Natural Resources.

top of the door aided in determining door closure. Use of binoculars increased the distance required to check traps to avoid flushing uncaptured birds prematurely.

Mist Nets

Vocalizing male bitterns were approached to within 100 m by wading out from the shore or via airboat to set mist nets. Three mist nets, 12 m long with a mesh size of 125 mm, were set in a "U"-shape configuration with the open side of the "U" toward the bittern. Nets were hung on two three-m telescoping lengths of galvanized conduit (one 1.27 cm diameter inside of a 1.90 cm diameter conduit) at each end of the net. The net top was about 3.5 m high and the net bottom was at vegetation level. A cassette tape player with the same recording previously described was placed approximately two m in front of the net. After setting the net, observers moved approximately 100 m to the side. Male bitterns usually made a low level flight to within 20 m of the net or flew directly into the net. Observers approached from behind the bittern and flush the bird toward the nets.

To capture females returning to feed nestlings, four mist nets were set in a square surrounding the nest. After setting the nets, observers moved back 100 m and waited for the female to land and to have had time to walk under the nets into the square. Observers approached the nets on an airboat or on foot from opposite sides, flushing the female into the nets.

Landing Nets

Long-handled fish landing nets were used to capture flightless or poor flying bitterns during the wing molt that were encountered in the marsh with the airboat. The net hoop was 80 cm in diameter with a telescoping handle that extended to 2.8 m. Net mesh was 50 mm. The landing net was also used to capture females on nests. Nests were marked on a prior visit by placing a small piece of black tape on vegetation directly above the nest to aid in placing the landing net over the nest.

Night Capture

To recapture radio-marked birds at night, hand held, 100,000 candlepower spotlights were used while on the airboat. When walking spotlights were attached to a helmet and powered by a battery placed in a plastic food cooler mounted on a backpack similar to that used by Drewien *et al.* (1967). Birds that flushed prematurely from the approach of the airboat were picked up in the beam in an attempt to confuse them and force them to land. Most capture attempts were made by two people, approaching the bittern's approximate location on foot. A landing net was used to capture birds once they were located visually.

Net Gun

Two styles of net gun were tested. One gun was manufactured by Coda Enterprises, Mesa, Arizona and shot a square net with 3.3 m sides. The other gun, made by Northern Prairie Science Center, Jamestown, North Dakota (Mechlin and Shaiffer 1980), shot a triangular net with three-m sides. Most net gun attempts were made on birds feeding in roadside ditches. Some attempts were made from the airboat at birds that did not flush immediately. Another technique involved a person crawling toward a vocalizing male bittern while carrying the net gun and a tape recorder and intermittently playing the recording of a vocalizing male bittern. The person and the bittern would approach each other and when the distance closed to less than ten m, the person would rise and shoot the net at the flushing bittern.

Funnel Traps

Funnel traps (Toepfer *et al.* 1988; Schroeder and Braun 1991) were made of 2.5 cm × 5 cm mesh welded wire with two drift fences of poultry wire approximately 10 m long. The drift fences were placed in a "V"-shape along the edge of ditches where birds were consistently feeding. The open ends of the drift fence "V" were placed near the edge of the water. The funnel trap was set at the pointed end of the "V" in vegetation about five m from the water. Observers visited the trap frequently and when a bittern was between the poultry wire leads, it was gradually disturbed so it would walk into the trap without flushing. When not being tended, the trap was lifted so animals could escape under it.

RESULTS

Mirror Trap

Mirror traps had a 50% success rate (Table 1) for capturing adult male American Bitterns and were most efficient because they did not require continuous observation. Success was improved by moving traps closer to the bittern if they failed to approach the trap. Two or three moves were sometimes made before capturing the male or the at-

Table 1. Trapping results for American Bitterns 1994-1998.

Method	Number of attempts	% success
Mirror trap	127	50
Mist net—males	15	40
Mist net—nests	24	50
Landing net—molt	29	76
Landing net—nests	23	70
Night capture	15	33
Net gun	47	6
Funnel traps	7	29

tempt terminated. No mortality occurred while birds were in traps. Scraping or other injury was infrequent and minor. After the first year, one to three males were recaptured each year with mirror traps. Recapturing birds during the same breeding season was avoided but it did occur on several occasions.

Mist Nets

Mist nets were successful in 40% of the attempts to capture males (Table 1) and was the most versatile technique because of its success in shallow and deep marsh situations. Unsuccessful attempts were due to bitterns flushing prior to complete set up, not approaching close enough to the net, flying past the net, walking under the net before flushing, escaping the net before we could reach the bird, or not responding to the tape recording. This technique was also successful in recapturing males from prior years.

Capture attempts on females at nest sites were 50% successful.

Landing Nets

The success rate of 76% (Table 1) for capture attempts of molting birds does not include birds flushed that exhibited a strong flight and were not pursued. Most molting bitterns were encountered in large areas of Cattail (*Typha* sp.) away from shorelines while conducting other activities with the airboat or on trips made expressly for this purpose. After a capture attempt, additional searching in the area was often successful in locating additional bitterns.

Most bittern females that were incubating stayed on the nest and were captured 70% of the time. After the eggs hatched, success decreased as nestlings grew older and moved away from the nest.

Night Capture

Night capture attempts on birds that were molting were successful, but attempts to capture birds not in the wing molt were unsuccessful and lowered the success rate to 33%. Birds whose flight was not impaired by molting became increasingly wary and flushing distance increased from less than ten m to over 50 m with subsequent approaches. Only one female in partial molt stopped flying when shined with the spotlight.

Net Gun

The three birds captured were shot at from an airboat while they were still on the ground. On three other occasions, birds were hit with the net but escaped before they could be secured. One captured bird was euthanized due to a broken wing inflicted by a net weight.

Funnel Traps

Funnel traps were only used during 1997 and 1998. Both of the birds captured were females. It was an opportunistic method that had to be used immediately when a bird consistently feeding in the same spot was located.

DISCUSSION

Mirror traps were the most efficient method for capturing adult males. They provided the opportunity to make multiple catches per morning because they did not require continuous observation and several sets could be made. Mirror traps were periodically checked as long as males were responding to the tape, which was usually around midday. Male bitterns also vocalize in the evening and a few mirror trap sets were made during evening hours. Since 1998, several birds have been captured during the

evening. Water depth was not recorded for each trap set but we believe that mirror traps were most successful when placed in five to ten cm of water with heavy vegetation along each side of the trail. In deeper water, problems were encountered in keeping the trap solidly elevated to allow entry. Mirror traps were successful only during the breeding season. Males were captured from 1 May to 18 June but the peak activity occurred during late May. The large mesh wire was instrumental to the success of the traps and for minimizing injury. One pair of traps constructed of 1.2 cm × 2.5 cm mesh failed to catch any bitterns. We believe these traps were too closed in for the bitterns to feel comfortable entering.

The versatility of the mist nets allowed us to capture males in deep water, males that would not enter a mirror trap and females at nest sites. The mesh size of the nets allowed several birds to escape without becoming entangled. We modified one net by cutting out every other string to double the mesh size, and the birds that were captured in it entangled in the netting better than the other nets. Success with mist nets was limited to calm mornings presumably for two reasons. Wind movement of the nets may have alerted the bitterns to the nets presence or the bitterns may not have heard the recording due to the distance at which the nets were set from the bittern.

We did not detect any abandonment of territories due to the playing of the vocalization call in male territories even on birds that were difficult to capture and had traps set near them on several consecutive days. After radio-marking and releasing males near the capture site they were located by telemetry in the immediate vicinity of the capture site on subsequent days and many were also vocalizing. We did not record any nest abandonment due to capturing and radio-marking the females.

Net guns may be a good technique for researchers skilled in its use. This technique was time consuming, required practice beforehand and required getting close to the bird. Even with our limited use of this technique we encountered one bird injury. Injuries to birds have been reported by other researchers using this method (Mechlin and Shaiffer 1980).

We have not fully explored the application of funnel traps. They provided opportunities to capture females prior to incubation, which has been a shortcoming of other methods employed.

ACKNOWLEDGMENTS

The authors are grateful to the staff at Agassiz National Wildlife Refuge for logistical support that kept us in the field. U.S. Fish and Wildlife Service, Division of Migratory Birds and Division of Refuges partially funded the project. Saint Cloud State University and University of North Dakota respectively supported Wayne Brininger and Dave Azure while obtaining Master Degrees as part of this work. Society of Tympanuchus Cupido Pinnatus Ltd. contributed funding and support.

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